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AUTHOR Din, Feng S.; McLaughlin, Donna
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ABSTRACT

This paper discusses the outcomes of a study that investigated whether applying the discrete-trial approach is effective in teaching children with autism to learn functional and pre-academic skills. Participants were four young children with autism (ages 3-4) attending a preschool special education program of an urban public school. Discrete-trial training with positive reinforcement was provided for 7 months to 1 year for approximately 1 hour per day. At the beginning of each training session, the teacher focused the child's attention, first by talking to the child and moving the child's face toward the teacher's face, then by verbally presenting a discriminative command to the child, waiting for the child to respond, and prompting as necessary. As soon as the child responded, the teacher made a rewarding remark and gave the child some tangible reward or a toy to play with for a brief moment. Children were taught to follow directions, identify objects, body parts, and action verbs, recognize functional vocabulary, and speak words and simple sentences. Results indicated that they all learned various functional and pre-academic skills and that two of the children learned to speak simple words and sentences. Graphs showing the children's progress are attached. (Contains 10 references.) (Author/CR)

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Teach children with Autism with the Discrete-Trial Approach

Feng S. Din

William Paterson University

Donna McLaughlin

Haledon Public Schools

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Abstract

The study investigated whether applying the discrete-trial approach is effective in teaching children with autism to learn functional and pre-academic skills. Participants were 4 young children with autism, 3 to 4 years old. Approximately 1 hour per day discrete-trial training with positive reinforcement was provided. The children received 7 months to 1 year training respectively. Results indicated that they all learned various functional and pre-academic skills. And 2 children learned to speak simple words and sentences.

Teach Children with Autism with the Discrete-Trial Approach

Autism is a complex developmental disability. It poses major challenges for therapeutic intervention. With the early childhood onset and the pervasive nature of the disorder, children with autism typically are severely impaired in multiple areas of functioning: cognitive, affective, and social (Harris, 1988).

In the 2 decades after the mid-1960s, researchers, educators and clinicians applied various new ways to educate children with autism: structured learning environment, operant teaching techniques, and the role of parents as cotherapists. The current trends of educational strategies focus on: variations in the teaching context (Donellan, Mesaros, & Anderson, 1985), teaching of social skills, teaching of speech, language and sign language, and management of disruptive skills (Harris, 1995). It has been recognized that behavior modification techniques provide the most effective teaching strategies for individuals with autism (Harris, 1988; Rincocorer, Koegel, & Russo, 1978).

The research literature provides enormous knowledge on autism (Harris, 1995; Schopler & Mesibov, 1995). However, a small number of studies exist on the efficacy of various forms of discrete-trial procedures utilized in teaching children with autism. To a limited extent, the discrete-trial procedures have been applied in reading research. West, Stanovich, Cunningham and Feeman (1982) utilized discrete-trial procedures to compare the

performance of skilled and less skilled third and sixth grade readers (N=37) on picture, letter and word naming tasks. They found that a general name-retrieval deficit did not appear to account for reading problems of the less skilled readers. Instead, reading deficiency was associated with general weakness in phonological analysis skills.

To reduce self-stimulatory rituals, Woods (1981) applied the discrete-trial procedures in delivering basic motor and vocal imitation training to a 6-year-old child with autism and another child. Results indicated that the autistic child's self stimulatory behavior was almost totally eliminated in the presence of a beach hat.

Marianda-Linne and Melin (1992) compared the discrete-trial procedures and incidental teaching in the teaching of 2 children with autism the expressive use of color adjectives. The two teaching procedures were performed in a classroom setting. The results showed that discrete-trial teaching was more efficient, produced fast acquisition and initially, greater generalization. The incidental teaching was found to be effective by follow-up in the language development of the children with autism.

Applying the dicrete trials, Woods (1987) trained 4 boys with autism (4 to 10 years old) to perform coloring and block-assembly play responses. A naturalistic cuing procedure was compared to giving verbal instructions to instigate play responses. Generalization across comparable play activities with only naturalistic cuing was probed. The findings indicated that

for all the boys, where antecedent cues for training matched those found in the generalization condition, there was substantially more carryover.

The purpose of the study was to investigate whether applying the discrete-trial approach is effective in teaching young children with autism to learn functional and pre-academic skills.

Method

Participants

The participants in the study were 4 Caucasian boys (3 to 4 years old) with autism. They were attending a preschool special education program of an urban public school in the northeastern region. They joined the program at different times of 2 school years. Specific information on each child prior to the treatment in the program follows:

1. Chris was 4 years old when he first joined the program. He lived in a single parent family. His mother worked two jobs. Chris was diagnosed as having autism by a pediatric neurologist. He showed no eye contact with anybody, did not respond to anyone. He frequently closed his eyes. He could make speech sounds, and repeat simple words.

2. Isaac was 3 years and 9 months old when he first came to the program. He lived with both parents. His family had lower middle class income. He was diagnosed by a pediatric neurologist as having autism and PDD plus ADHD. He had limited speech, could repeat simple words and two or three-word sentences. He showed no

eye contact when he was talked to, and he did not respond to anyone's question or greetings. He played with his private part. He showed repetitive behavior. He was also hyperactive--running around all the time.

3. Sam was 4 years 2 months old at his first arrival to the program. He lived with both parents. His parents had lower middle class income. He had no speech but echolalia only. He was diagnosed as having autism and PDD by a pediatrician. Sam was hyperactive--running around in the classroom all the time. His attention span was short. He would hit the teacher or pull teacher's hair when frustrated.

4. Rodney was 3 years 2 months old when he first came to the program. He lived with both parents. His family had lower middle class income. He had no eye contact, no speech, only babbling sounds. He acted alone, looked at the mirror all the time. He would sit alone at a table for a long time. He was diagnosed as having autism by a pediatrician.

Also participating in the project were 1 special education teacher (female, Caucasian) and 2 teaching aides (female, Caucasian). The special education teacher had 10 years of teaching experience, certified to teach preschool-age children with disabilities. The teaching aides were in the thirties of age. The special education teacher trained them how to apply discrete trials and positive reinforcement to train the children with autism.

Design and Procedure

The discrete-trial approach applied in this project took the following format: At the beginning of each training session, the teacher (or aide) gets the child's attention first by talking to the child and moves the child's face toward the teacher's face. Now she presents verbally with a reasonably loud voice a discriminative command (or gives one task) to the child; waits for the child to respond, and prompts as necessary. As soon as the child responds, the teacher makes a rewarding remark with a reasonably loud voice and gives the child some tangible reward or a toy to play for a brief moment (Here no control is exercised by the teacher on the time interval before issuing the next command.). At this moment, the teacher marks down the child's response on the Behavior Recording Sheet (see Appendix). Then the teacher takes back the toy, put it aside as necessary, and moves on to issuing the next command. In the same manner, 10 such trials are attempted on one task. Multiple tasks are tried in each training session.

The assessment (diagnosis) information for the children was transferred from their physicians to the school. However, each child was observed and assessed for different length of time by the special education teacher. The purpose of the observations was to identify priority skills for each child to learn as part of the IEP requirement, and to determine each child's preferences in terms of his likes and dislikes (also called reinforcer assessment).

The reinforcer assessment was conducted on "tangible items, activity reinforcers, social and sensory reinforcers, and areas of interest." This information was used to provide positive reinforcement in the discrete-trial training process. The reinforcer assessment was an ongoing process to some extent. The baseline for the skills to be taught to each child in the program was zero. Based on all the information collected, an individualized training program was developed for each child.

Each school day, all children (mostly around 5) in the program would first have group activities (e.g., playing group games, singing songs, or having other activities) for 1 hour. During these activities, positive reinforcement and incidental teaching were applied to all children. However, with the group activities, reinforcement and incidental teaching were not applied in a highly structured way. No more than 2 children with autism were in the program in any semester.

After the group activities, a child with autism would receive 40 to 60-minute discrete-trial training, 4 to 5 days per week. The child would receive adapted physical education for 1 hour every other week. During the training, positive reinforcement was utilized; items such as food, candy, toys, pictures, etc. were provided to each child as rewards. Rewards for each child were selected based on each child's personal preference, which was determined through the teacher's observations. Both the teacher and the aides provided direct discrete-trial training to the children on different days.

Although the specific skills to be learned by each child were different, each child was taught through the discrete trials and positive reinforcements to: follow directions, identify objects, body parts and action verbs (human body movements on pictures), recognize functional vocabulary, and speak words and simple sentences (if a child's condition allowed).

A computer software with touch-screen and sound feature (an interactive feature) was also utilized daily to teach each child with autism. In the program, each child was taught to identify words describing human body movements and some sight words. The program was provided to enhance the learning occurred in discrete-trial training. Each school day, a child would receive such training for 10 to 20 minutes.

The mothers of the children with autism received training from the teacher on how to apply the discrete-trial approach. They were asked to provide such training daily at home to their child. However, the authors did not believe that such training actually occurred to any child at home during the school year.

A chart was designed for recording the responses of each child in the discrete-trial training. Each response of a child was recorded by the teacher on the chart immediately after each trial (see Appendix). A correct percentage would be calculated for each attempted task. Daily records were kept for each child. These data were plotted on a progress chart for each child. In sum, the applied behavior analysis approach was utilized in this program.

Results

Participating in the discrete-trial training program for 7 months to approximately 1 year respectively, the 4 children with autism learned various skills at or over (mostly over) the 85% mastery level. Main results follow:

1. Chris received the discrete-trial training from April to December, and learned to do the following:

A. Name objects and actions (vocabulary training; the following were learned during different days of the school year, not the same periods):

Say action verbs (mastered in 2 to 5 days): clapping, sleeping, jumping, crying, sneezing, and so forth.

Say objects (in 3 to 5 days): blanket, dresser, pillow, closet, kitchen knife, fork, napkins, toaster, sink, pot, bowl, stove, table, refrigerator, bloom, bubbles, cow, pig, mama, and so forth.

Say: I want bubbles (in 5 days), and so forth.

Say: See you later; I love you back (by the end of the training period).

Read: read simple words (by the end of training period).

B. Follow directions: Look at me (in 1 month), Touch eyes (see Figure 1), Give record (in 1 month); Sit down (see Figure 2), and so forth.

He learned to do the following in 3 to 4 days: Stamp feet (in 3 days), Touch nose (in 4 days), Blow whistle (in 2 days), and so forth.

2. Isaac joined the preschool program for 1 year. Within various time frame, he learned to do the following:

A. Follow directions:

One-step command: Sit down (see Figure 3); Look at me (see Figure 4); Come here (in 3 months).

Two-step command: Stand up, put eraser under table (in 3 days); Touch ears, clap hands (in 2 days).

Three-step command: Touch nose, stand up, clap hands (in 11 days); Stand up, touch computer, come back (in 3 days); Touch knees, touch nose, stamp feet (in 4 days).

B. Name objects and actions (vocabulary training):

Isaac learned to name the following objects in 2 to 3 days: blanket, closet, dresser, pillow, and sliding.

He learned to tell texture in 3 to 4 days: hard, soft, rough, and smooth.

He learned to name the following actions in 2 to 7 days: sliding, sleeping, eating, painting, riding bike, throwing ball, reading book, cutting, blowing balloon, bouncing ball, and so forth.

C. Answer functional questions in the same 4-day period: Give me what you write with; Give me what you wash hair with; Give me what you sleep in.

D. Answer "Where is ... ?" type of questions in the same 3-day period: Where is car? Where is girl? Where is boy?

E. Maintain eye contact in 3 months.

3. Sam came to the program in October and left the program at the end of July for another school. Within various time frame, Sam learned to do the following:

A. Follow directions: Look at me (see Figure 5), Hand over Pec System of Bus (in 6 days), Make back-and-forth motion with bus (in 2 days), Pop bubbles (in 3 days), Clap hands (in 3 months), Sit down (in 1 month), Touch nose (see Figure 6), Come here (in 6 days), Get boat (learned in 4 days for boat at 1-foot away; in 4 days for boat at 6-feet away), and so forth.

B. By April, Sam began to apply what he learned in school at home: When his father said "Come here, Sam," he did so as he was told every time. (The relatives of the Sam's family noted that Sam had changed so much since he started school, according to Sam's mother.)

C. Sit together with other kids.

4. Rodney was in the program from January to July. Having been in the program for 1 semester, he learned to do the following:

A. Follow directions: Clap hands (in 1 month), Touch nose (in 4 months), Sit down (in 1 month), Stand up (in 4 months), Use spoon independently to eat yogurt (see Figure 7), Throw this away (in 5 days), Touch head (in 4 days), Get bus (in 2 weeks), Get fire truck

(in 1 month), Touch bike (in 5 days), and so forth.

B. Imitate: Put block in container (see Figure 8), Bang on drum (in 6 weeks), Stamp feet (in 1 month), and so forth.

C. Discriminate between baby doll and dinosaur (in 1 month).

D. Rodney's mother said that Rodney applied what he learned in school at home: follow directions.

Discussion

The results indicated that all 4 children with autism learned various functional and pre-academic skills through the discrete-trial training procedures applied in this project. As described above, special efforts were made by the teaching staff to assure that the preferred reinforcers to each child were provided respectively. This practice may have contributed significantly to each child's learning results. This procedure may have worked as to keep a child interested or maintain his attention in the training process, which facilitates the child to engage in the training.

It is necessary to point out to the fact that the training staff of the project used reasonably loud voice in giving commands and verbal feedback to a child in training. The level of loudness may have played a positive role in a child's learning process. Doing so may have worked as to provide a strong stimulus to the child, and also may have worked as to help sustain the child's attention to the training process.

With the training format applied in the project, the interval duration between the trials in a teaching sequence was not controlled. It was always "a brief moment." The estimated length of this "moment" was 10 to 15 seconds. Occasionally, it was a little bit longer. The transition from one trial to the next was exercised in a natural way, and was the teacher's decision of the moment. This practice was different from what Koegel, Dunlap and Dyer (1980) recommended: a fast-paced instructional pattern. This natural flow type of pace did not seem to have generated a negative impact on the learning of these children with autism. Even though the duration was not under tight control, still it was generally "a brief moment"--allowing the child in training a moment to play a toy or eat something and the teacher time to record the child's response on the sheet. It was not in a "fast-pace", it was not in a slow pace, either.

This training approach seems to be effective in teaching children with autism. However, with respect to the issue of efficiency, it depends on the tasks to be learned by an individual child with autism and the difficulty level of a specific task. The results showed that it took one child a few months to learn one skill, but only a few days to learn another. A task seemed to be difficult for one child to learn, but was easy for another child to handle. Whether a task is difficult to learn seemed to be a "relative" concept in the training of the 4 children with autism. It is not known why this is so. It is suggested that professionals should not expect a child with

autism to learn a skill within a subjective time frame.

In sum, the whole approach follows a practical design. Its sequence flows in a natural way. Not much control is demanded in applying the procedures. This approach was applied in a natural classroom for over 2 years, and it worked well. It is easy to use.

Conclusion

The results indicated that all 4 children with autism learned various functional and pre-academic skills within different time frame through the discrete-trial training approach applied in this project. The evidence seems to support that this approach was effective in teaching children with autism to learn functional and pre-academic skills.

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Appendix

BEHAVIOR RECORDING SHEET

Student Name _____

Task Behavior _____

Rewards Given _____

Trial	Date							
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
Total %								

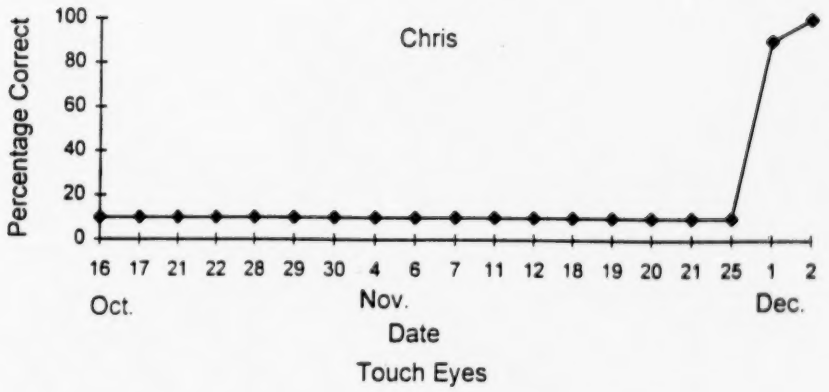

Figure 1. Progress record of Chris in "Touch eyes" training.

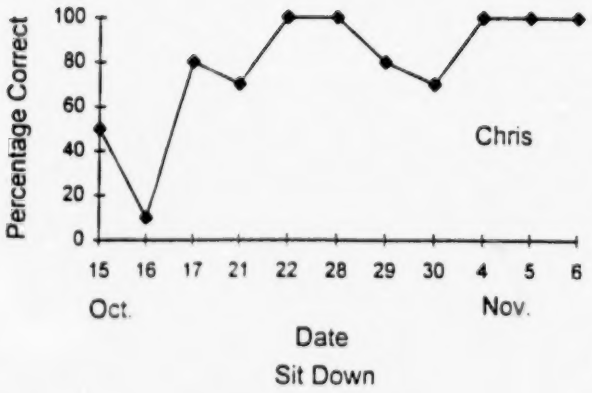

Figure 2. Progress of Chris in "Sit down" training.

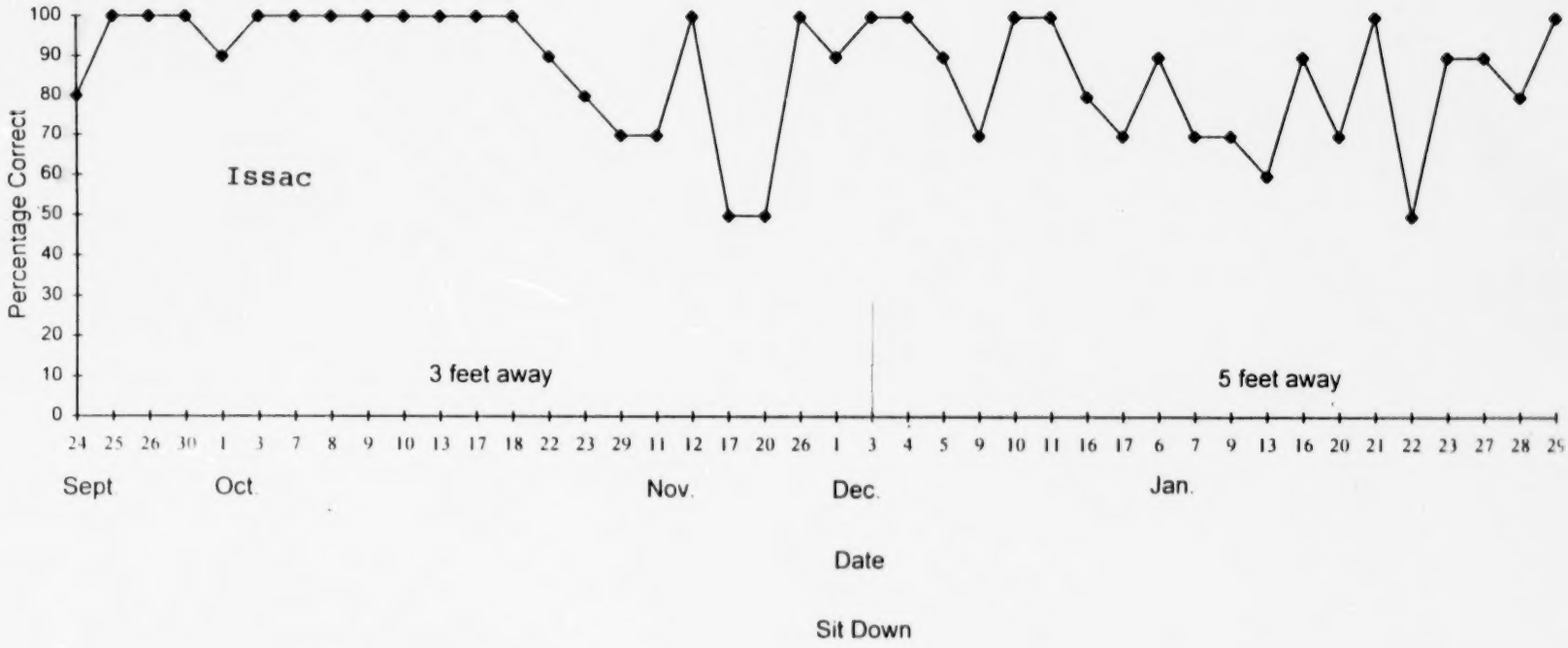

Figure 3. Progress record of Isaac in "Sit down" training.

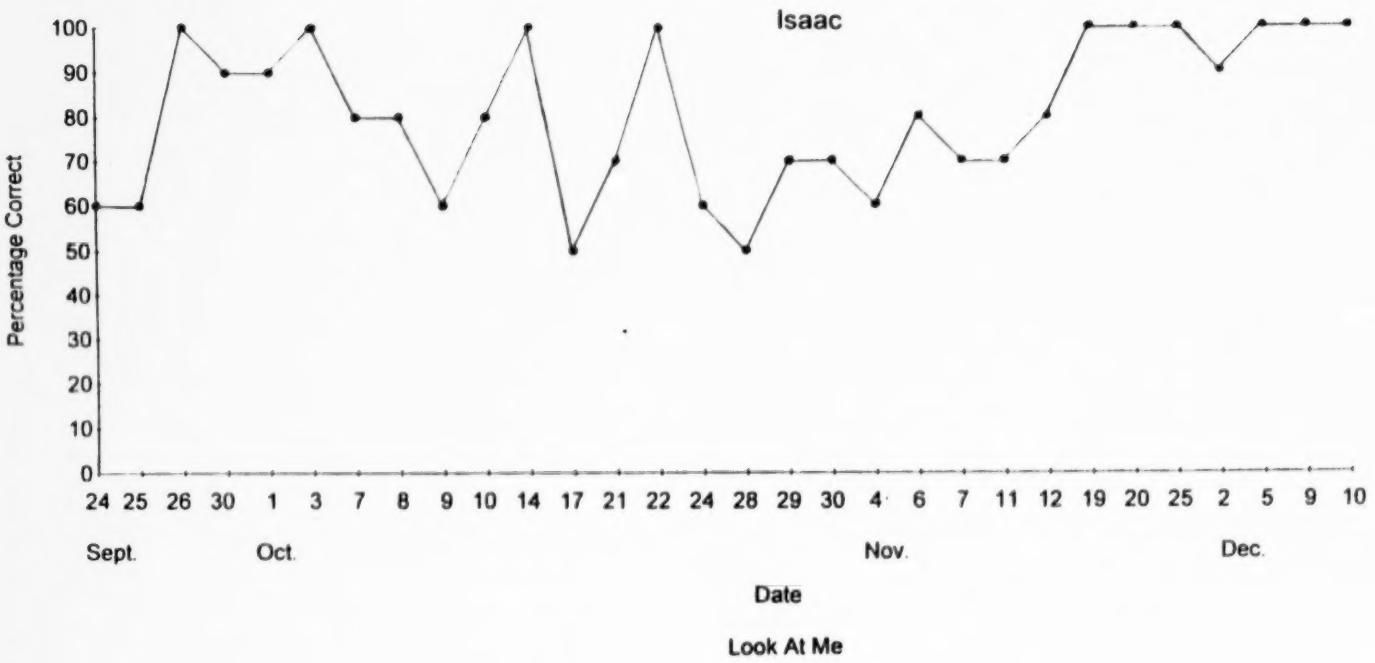

Figure 4. Progress record of Isaac in "Look at me" training.

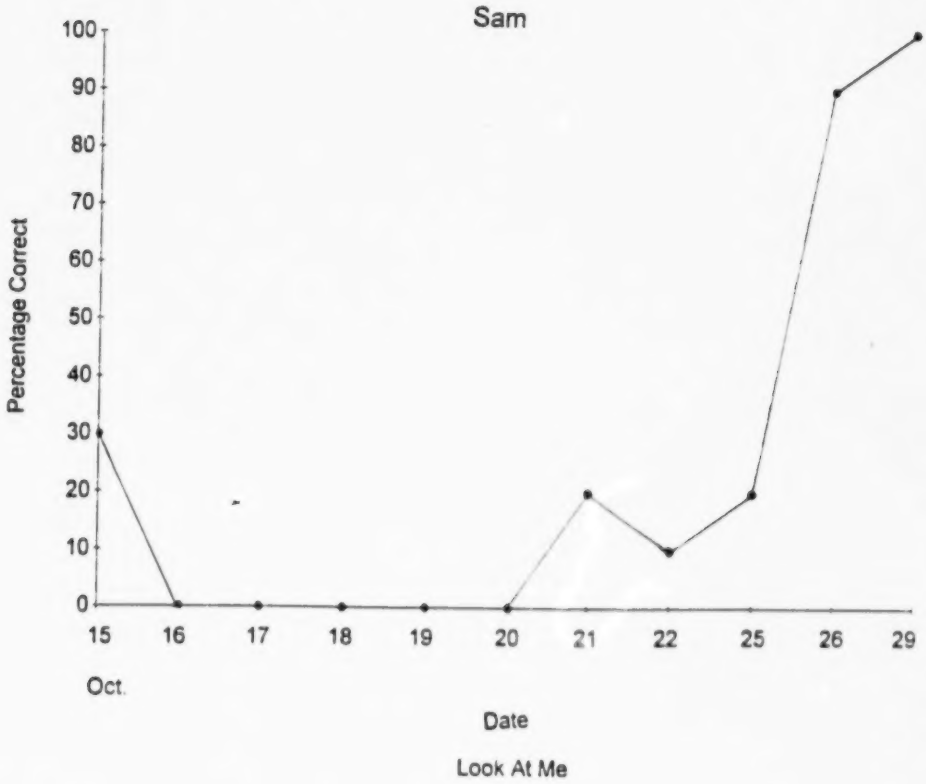

Figure 5. Progress record of Sam in "Touch eyes" training.

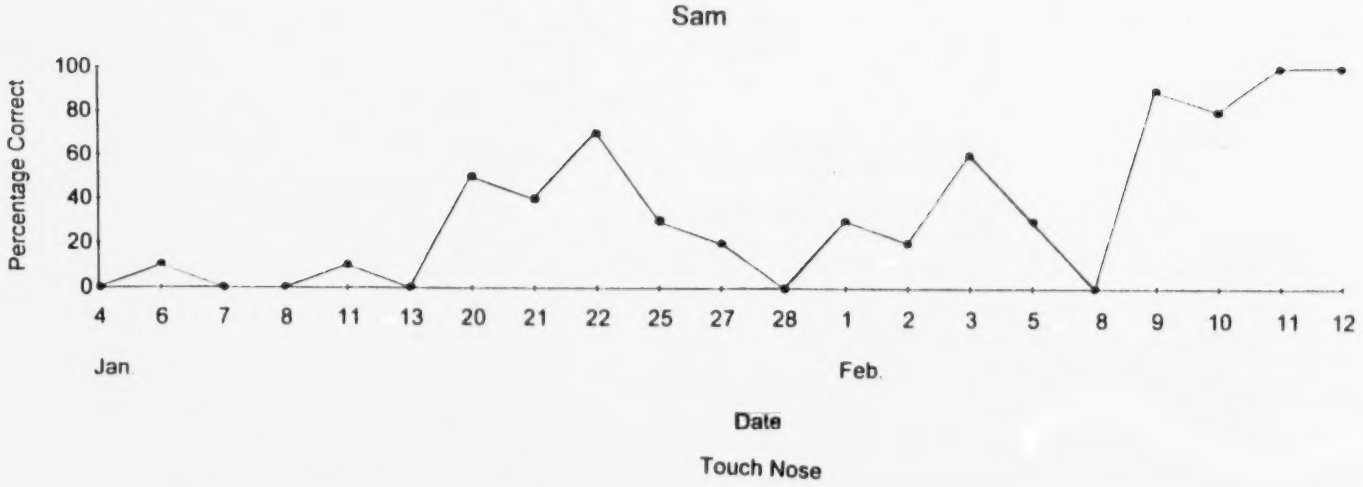

Figure 6. Progress record of Sam in "Touch nose" training.

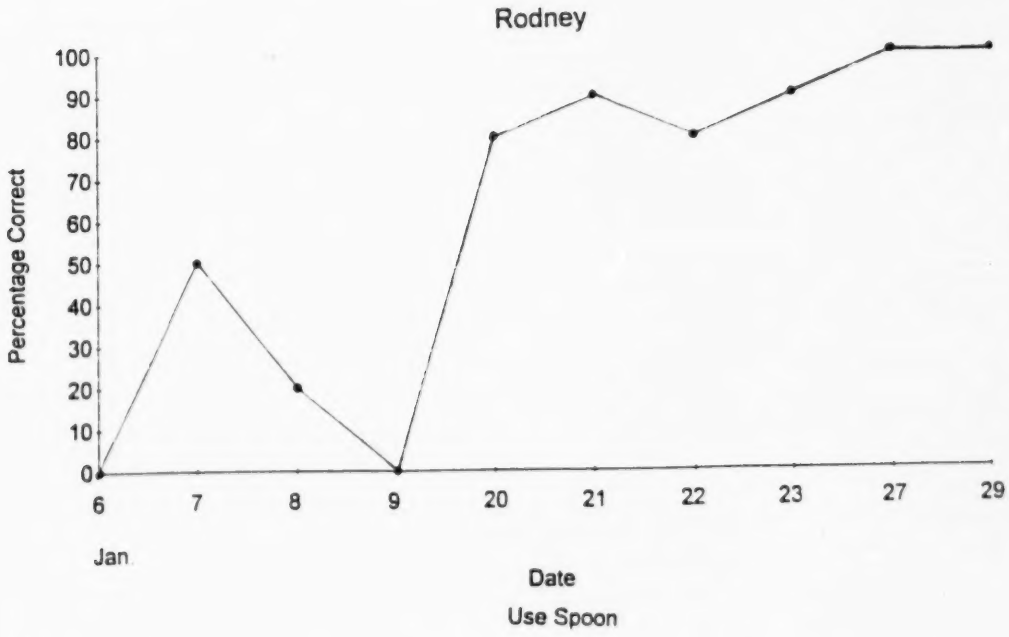

Figure 7 Progress record of Rodney in "Use spoon independently to eat yogurt" training

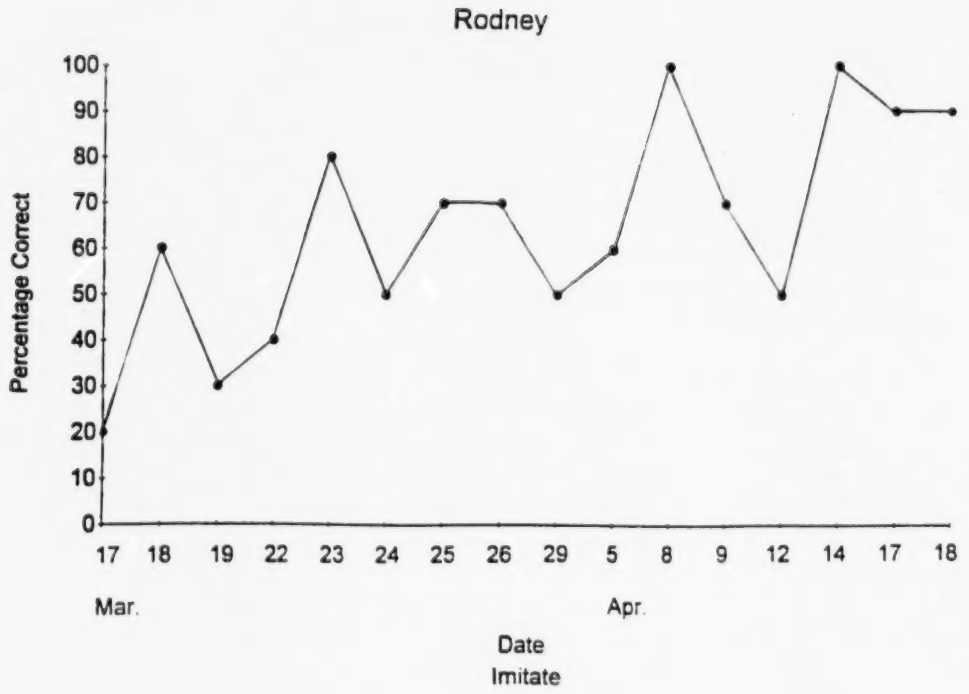

Figure 8. Progress record of Rodney in "Imitate--Put block in container" training.